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The milk composition of the different treatments were not significantly different amongst the treatments (Table 2). The observed milk composition levels were within reported ranges (Farah, 2004).

Effects of supplementation on body weight: Camels supplemented with maize germ-based diet (T3) had significantly ($P<0.005$) higher weight at the end of the study (Table 2). However, animals showed a drop in body weight in all treatments, the severity of the drop being highest for T1 and lowest for T3. The observed drop in body weight can be attributed to declining range browses as the dry season progressed, while maintaining the supplemental rations.

Conclusion

Feed supplementation of lactating camels in the dry season positively influenced milk yield, but not milk composition. Maize germ-based supplementation showed better response than acacia pods-based diets. Loss of body weight was lower in supplemented lactating camels.

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TRANSFER OF PCBS TO THE BACTRIAN CAMELS

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Abstract

The study aimed to determinate the mechanisms of bioaccumulation and decontamination of Polychlorinated biphenyls (PCBs), in the body of two-humped camels *Camelus bactrianus,* following an oral exposure.

The experiment has been carried out in Sozak region of South Kazakhstan. Four lactating two humped camels (*Camelus bactrianus*) received 0.8 mg of indicator PCBs (Aroclor 1254, 1.3 µg/kg body weight) during two months and followed by a 4-month decontamination period. Milk and hump fat of experimental camels have been sampled. Milk samples were analyzed using a liquid-liquid and hump fat using solid extraction by gas chromatography and mass spectrometry method. Concentrations of PCBs in milk and hump reached a plateau at the end of the 2 months exposure period. Transfer rates into milk ranged between 2 for PCB 101 and 71 % for PCB 180 of the daily dose, which was generally lower than rates observed in ruminants. In the same time, the most important part of the contaminants has been stored in the humps. At the end of experimentation, the total quantity of PCBs excreted in milk was estimated to 28.6 µg and the total quantity accumulated during the contamination period in humps was 5530 µg. Despite a huge variability between the different congeners of iPCBs, the intermediate storage of lipophilic compounds in the humps reduced the concentrations excreted in milk but on the other hand would extent the duration of the decontamination period in comparison with ruminants.

Key words: Bactrian Camels, PCBs, transfer, milk, hump.

БАКТРИАН ТҮЙЕЛЕРІНЕ ПОЛИХЛОРЛЫ БИФЕНИЛДІҢ АУДАРЫЛЫМЫ

Зерттеу жұмысы, Екі-өркешті Camelus bactrianus түйелеріне пероральды әсерден кейінгі денелерінде полихлорвинилді дифенилдардың (ПХД) биожинақтау және залалсыздандыру механизмін анықтауға бағытталған. Эксперимент Оңтүстік Қазақстан облысының Созақ ауданында жүзеге асырылды. Төрт бота емізетін екі өркешті түйе (Camelus bactrianus) екі ай ішінде 0,8 мг индикатор ПХД (Aroclor 1254, 1,3 мкг / кг дене салмағына) алған және 4-ай зарарсыздандыру кезең беріледі, одан кейін эксперименттік түйелерден сүт және май үлгілері алынды. Сүт үлгілері газ хроматография және масс-спектрометрия әдістерін пайдалана отырып, қатты өндіру пайдалана отырып, сұйық-сұйықтық май және өркеш майы талданды. Сүт және өркештегі ПХД концентрациясы 2 ай экспозиция кезеңнің соңында платоға жетті. Сүт тасымалдау бағалары, әдетте, күйіс байқалады ставкалар төмен болды, ол ПХД 101 және тәуліктік дозада КСП 180 71%, 2-арасында ауытқиды.

Сүттегі ПХД беру бөлігі 2-ден 101 дейін және 71% дейін ПХД тәуліктік дозасы 180 дейін ауытқиды, әдетте бұл негізі, күйіс қайыратын жануарлар көрсеткіштерінен төмен болды. Сонымен қатар, ластаушы заттардың ең маңызды бөлігі өркеште сақталғаны белгілі болды. Эксперименттер соңында сүтіне ПХД жалпы саны 28,6 мкг бағаланды және өркеште ластану кезеңде жинақталған жалпы саны 5530 мкг болды. IPCBs түрлі серіктерінің арасында үлкен өзгермелілікке қарамастан, өркештегі липофильдік қосылыстар аралық сақталуы сүттің мөлшерін азайтады, бірақ

басқа жағынан шығарылады концентрациясы еді дәрежеде салыстырғанда зарарсыздандыру мерзімінің ұзақтығын төмендетті.

Түйінді сөздер: Bactrian Түйелер, ПХД, трансфер, сүт, өркеш

ПЕРЕДАЧА ПОЛИХЛОРИРОВАННЫХ БИФЕНИЛОВ ВЕРБЛЮДАМ БАКТРИАНАМ

Целью исследования было определение механизмов биоаккумуляции и обеззараживания полихлорированных бифенилов (ПХБ), в теле двугорбых верблюдов Camelus bactrianus после перорального воздействия.
Эксперимент был проведен в Сузакском регионе Южного Казахстана. Четыре кормящих двугорбых верблюда (Camelus bactrianus) получали 0,8 мг индикаторных ПХБ (Арохлор 1254, 1,3 мкг / кг массы тела) в течение двух месяцев и затем 4-месяца периода дезактивации. Были отобраны образцы с молока и жира горба экспериментальных верблюдов. Образцы молока были проанализированы с использованием жидкостной, а горб жира с использованием твердой экстракции с помощью газовой хроматографии и методом масс-спектрометрии.
Концентрации ПХБ в молоке и горбе в конце 2-месячного периода экспозиции достигало пика. Передача порции в молоке колеблется от 2 для печатной платы 101 и 71% для ПХБ 180 в суточной дозе, которая была в основном ниже, чем у жвачных животных. В то же время, наиболее важной частью примесей были сохранены в горбу. В конце эксперимента, общее количество ПХБ в молоке было 28,6 мкг и общее количество накопленной в период загрязнения в горбу 5530 мкг. Несмотря на огромное разнообразие между разными связями iPCBs, промежуточное хранение липофильных соединений в горбах уменьшает концентрацию в молоке, но с другой стороны увеличивает степень продолжительности периода деконтаминации по сравнению с жвачными животными.

Ключевые слова: верблюды бактриан, ПХБ, молоко, горб.

Introduction

Kazakhstan has suffered for many years from chemical pollution of different origin (radionuclides in nuclear test site, heavy metals in metal industry, organochlorine compounds from the massive use of Sovol mixtures and pesticides in agriculture). A part of these pollutants can be recovered in steppe areas where Bactrian camels are reared. Those animals are used for meat and milk, especially for preparing *shubat (*fermented camel milk). Thus, the risk of contamination of human consumers needs to be studied to ensure the safety of consumers although a previous field study reported only modest concentrations of polychlorinated biphenyls in camel milk. Indeed these animals have a very specific lipid metabolism which is submitted to important variations during the yearly changes in climate and roughage offer. Therefore, the objective of the present communication was to assess the risk of excretion of contaminants in milk collected in Bactrian camel exposed to PCBs as well as their capacity to decontaminate.

Materials and methods

The trial has been carried out in Suzak region of South Kazakhstan, close to the Moyun-Kum desert with approximately 100 mm of yearly rainfall. Four lactating adults *Camelus bactrianus* have been enrolled. The trial consisted in a 56 days exposure of the animals to a controlled dose of indicator PCBs (iPCBs) followed by a 4 month decontamination period. The daily dose consisted to 0.8 mg of Aroclor 1254® (mixture “late”, batch n° 4-8586, Sigma-Aldrich France) which were incorporated in a gelatin capsule filled in with icing sugar. Each morning, each camel received one capsule integrated in a small lump of dough directly in the mouth. The first day, a priming dose of 9.13 mg iPCBs was injected IM in order to speed the reach of the enrichment plateau (steady state). The collected samples were milk and hump fat by biopsy. Control samples were collected in the first day of experiment before starting the oral exposure period by capsules.
Samples were analyzed using a liquid-liquid and solid extraction followed by cleanup on a multi-layer silica gel column, evaporative concentration to 20 µL and analysis on 7890A/5975C TAD TVL GC-MS (Agilent, USA) equipped with Combi-PAL autosampler (CTC Analytics AG, Switzerland). Two µL of sample was injected to split/splitless inlet heated to 250 ^{o}C in splitless mode. Separation was done on a DB-5MS 60 m x 0.25 mm, 0.25 µm film column (Agilent, USA) at a constant flow of helium (purity 99.995%, Orenburg-Tehgas, Russia) equal to 1 mL/min. Detection was done in selected ion monitoring mode (SIM) using 6-group program for detection of target ions. PCB209 was used as internal standard spiked to samples with 300 pg.
The statistical differences between the 3 periods were assessed by variance analysis (ANOVA) using XLstat software (Addinsoft ©).

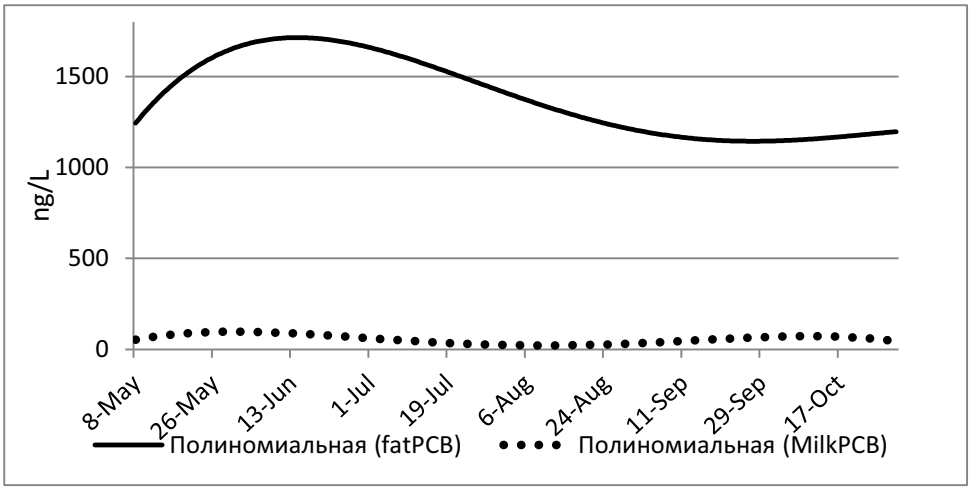

Figure 1 – The PCB concentrations in different compartment of the camel (hump fat and milk) according to a polynomial model

Results and discussion

At the end of experimentation, the total quantity of PCB excreted in milk wase estimated to 28.6 µg and the total quantity accumulated during the contamination period in hump was 5530.4 µg. At the beginning of the contamination period, the lipophilic properties of pollutants lead to a rapid increasing of their concentrations in hump, and because the animals are in phase of fat storage, in total quantity. At the same time, the concentrations in milk did not increase in a notable manner. When the plateau is reached after two months of contamination, the concentrations in milk increased, showing the elimination of pollutants. This phenomenon is accentuated because of the hump weight decreased after starting decontamination (during summer time) due to the fat mobilization. The concentration and the quantity of pollutants stored in hump decreased regularly all along the decontamination period (figure 1). The elimination in milk appeared low in quantity because the transfer to milk is in low percentage (between 2 and 9% depending to congeners) contrary to other species as cow and goat.

According to our results **t**he carry over rate (COR) in camel appeared lower than for the other species. The transfer rate of PCB 28 was 2 times less than in goats and 8 times less for heavy PCBs (PCB 180) than in goats and 9 times less than in cows. Non-coplanar, low chlorinated PCBs (i.e. 52 and 101) were very weakly transferred (<0.4%) into camel milk as previously reported in cows (< 2 and 4) and goats (between 5 and 10).

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FAECAL MICROBIAL DIVERSITY OF CAMELS FED GROUNDNUT CROP RESIDUE

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Abstract

The study was undertaken to understand the microbial diversity of camels fed groundnut (*Arachis hypogea*) crop residue under intensive management through culture-independent approach (metagenomic approach). Faecal DNA was extracted and subjected to shotgun sequencing using Ion Torrent PGM sequencer. The read data was analyzed using MG-RAST (metagenome rapid annotation server) version 3.0, a web-based tool. The camel faecal samples yielded 41,626,182 nucleotides assembled to 320,436 sequence reads with an average read length of 129 nucleotides, post QC. The taxonomic data was generated using M5RNA database and the functionality was assigned using SEED subsystems. The phylogenetic data revealed bacteria (86.6%) as the major domain. Firmicutes was the major phylum contributing to 68.3% of the bacterial domain. Phylogeny at the order level showed 49.7% of sequences assigned to Clostridiales (49.7%) with *Clostridum, Ruminococcus* and *Eubacterium* as the major genera. The metabolic potential revealed 12.3% of the sequences assigned for the protein metabolism with protein biosynthesis as the major functionality. A high taxonomic similarity was found with cow rumen, cattle faecal pool, canine gastro-intestine and functional similarity with cattle faecal pool. The present study provided a baseline for understanding the complexity of faecal microbial ecology of camels fed ground nut crop residue.

Key words: Camel, Groundnut crop residue, Microbial diversity, Faeces.

ТҮЙЕ АЗЫҒЫНДАҒЫ ЖЕРЖАҢҒАҚТЫҚ ӨСІМДІКТЕРІ ЖЕМ ҚАЛДЫҚТАРЫНЫҢ ФЕКАЛДЫ МИКРОБПЕН ЛАСТАНУЫ

Зерттеу жержаңғақ (*Arachis hypogea*) түйе өсімдік жемінің түрлі микробтық ластануын анықтау үшін, мәдени-тәуелсіз әдістерімен (метагеномдық тәсіл) қарқынды өткізілді. Фекалді ДНҚ-ны PGM ион торрент секвенсерді пайдалану арқылы секвенирлеу әдісімен өндірілген. Алынған деректерге MG-Rast (метагеном аннотациясы